

App'l No.: 10/683,603
Reply to Office Action of April 25, 2006

Atty. Dkt. No:
UCF-269DIV

10 - cathode compartment

11 - electricity -

Please replace the ABSTRACT on page 21, with the following rewritten Abstract:

--ABSTRACT

A novel process and apparatus are disclosed for sustainable CO₂-free production of hydrogen and carbon by thermocatalytic decomposition (dissociation, pyrolysis, cracking) of hydrocarbon fuels over carbon-based catalysts in the absence of air and/or water. The apparatus and thermocatalytic process improve the activity and stability of carbon catalysts during the thermocatalytic process and produce both high purity hydrogen (at least, 99.0 volume %) and carbon, from any hydrocarbon fuel, including sulfurous fuels. In a preferred embodiment, production of hydrogen and carbon is achieved by both internal and external activation of carbon catalysts. Internal activation of carbon catalyst is accomplished by recycling of hydrogen-depleted gas containing unsaturated and aromatic hydrocarbons back to the reactor. External activation of the catalyst can be achieved via surface gasification with hot combustion gases during catalyst heating. The process and apparatus can be conveniently integrated with any type of fuel cell to generate electricity. --